

## **ABSTRACT**

A method and apparatus for joint time and frequency synchronization for orthogonal frequency division multiplexing (OFDM) systems. A multitone pilot signal is sent in a designated OFDM symbol period. The receiver synchronizes to the pilot signal in a two-stage procedure. The first stage estimates the frequency offset coarsely with a frequency-domain correlation method and estimates the time offset with smoothed time-domain correlation. In a multipath channel, the smoothed time offset estimate is used to locate a cyclic prefix interval which captures the maximum total signal energy. The second stage improves the frequency estimate with a computationally efficient numerical optimization method.

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